

**MICROFLUIDIC MOLECULAR-FLOW FRACTIONATOR AND**  
**BIOREACTOR WITH INTEGRATED ACTIVE/PASSIVE DIFFUSION**  
**BARRIER**

**ABSTRACT OF THE DISCLOSURE**

A microfluidic device and method is disclosed for fractionating and/or trapping selected molecules with a diffusion barrier or porous membrane. The device includes a source fluid flow channel and a target fluid flow channel. The target fluid flow channel and the source fluid flow channel meet at cross-channel area and are in fluid communication with each other. A porous membrane separates the source fluid flow channel from the target fluid flow channel in the cross-channel area. A field-force/gradient mechanism may be positioned proximate the porous membrane with or without detection/state monitoring devices.